my guess and the actual distance, but oftentimes by the size of the rock when I reached it. A stone which looked as large as a cabin at four or five hundred yards would turn out to be about as big as a bushel basket. I found much difficulty in overcoming the tendency to exaggerate distance, though the Indians apparently were not so troubled." In response to my inquiry, he further writes: "When I got so I could judge the distance with comparative accuracy, it was simply that I had to accommodate myself to the new (to me) size of rocks at those distances." From which it is plain that the newly determined distance by pacing did not alter the apparent size of rock, the apparent size is simply interpreted for a new distance value. He says to himself, "that appearance means not as I might before have judged, but so much more or less distance." In other words there is here no judging from sense of accommodation or muscular sense of any kind, because that is unaltered, the image of the thing seen being constant as to size and appearance. Distance for Mr. Whitney seems to be purely a judgment, more or less revised by actual pacings, of fixed visual appearances.

Another point on the perception of distance was suggested by James (Psychology, II., 213): "I cannot help thinking that anyone who can explain the exaggeration of the depth sensation in this case (inverted vision) will at the same time throw much light on its normal constitution." This suggests whether bats which habitually hang head downwards would not have distance lengthened by erect vision. I do not know whether this could be tested by bringing certain foods to the attention of such animals at varying distances for inverted and erect vision. I found by some simple experiments upon myself and also upon a friend that lying down, with the head in horizontal position, distance was shortened, but I was not able to test at what angle toward inverted vision distance first began to lengthen. If not already tried, it might be useful for some of our psychological laboratories to set up a tackle, so that a person might be revolved through the whole circle, and the effect on perception of distance noted at all angles. It would also be well to test whether inverting the object looked at disturbed the sense of distance. I got no result in this matter by looking at objects at the end of a long hall.

HIRAM M. STANLEY.

LAKE FOREST, ILL., April 27.

THE MAMMOTH BED AT MOREA, PA.

TO THE EDITOR OF SCIENCE: The following interesting section was found on the glaciated outcrop of the Mammoth (E) bed at Morea, Pa., within one mile of the farthest southern limit of glaciation, and from 20 to 25 miles south of the moraine of Lewis and Wright. The measures are nearly vertical and form a narrow and deep basin. A section taken on the bed gave:

(a) Till of sandy, clayey nature, with burden of Pottsville conglomerate and varying sandstones, and with irregular lenticular patches of clean reddish clay of small extent. The solid burden is angular and sub-angular, and not polished nor striated. In some cases boulders 5 feet thick occur. Total thickness, 6 to 10 feet.

(b) Crushed anthracite, bright and firm, shipped to market. This is readily scraped up with the fingers. In places to the north hundreds of tons of this crushed coal have been sold. When we realize that this is under a sandy till we can estimate the comparative recency of glaciation. In some places this layer will reach 18 inches in thickness.

(c) Rotten anthracite with angular specks of firm slate from coal. Thickness $\frac{3}{4}$ inches.

(d) Sandy clay, usually grayish, but sometimes clear red or yellow. It bears rolled and angular quartz and slate pebbles, pieces of anthracite, but little anthracite dust. Thickness 1 inch.

(e) Crushed anthracite, firm and bright, like (b). Thickness $\frac{1}{4}$ to $\frac{3}{4}$ inches.

(f) The glaciated surface of the outcrop of the bed. Soft and fully rotted so as to be dull, like black chalk, and easily cut by the fingernail. Thickness $\frac{3}{5}$ of an inch.

(g) Solid and bright anthracite of the bed.

On comparing unglaciated or protected outcrops we find (f) measuring many feet in depth. We find here that the amount of decomposition of solid coal since glaciation is $\frac{3}{5}$ of an inch.

The presence of the layer (d) is peculiar between two layers of crushed anthracite which are bright and fresh.

The solid state of the coal is analogous to the similar state of the slate in the small quarry near Siegfried, where workable slate is quarried immediately under glacial gravel. Both are on the line of farthest ice extension—of earliest extension—and speak of its recency.

EDWARD H. WILLIAMS, JR.
LEHIGH UNIVERSITY,
May 11, 1896.

A METEOR.

TO THE EDITOR OF SCIENCE: A few days ago I observed a meteor of such size as apparently to merit record. At 7:30 p. m. of May 9th the object was first seen in the twilight descending in a straight course toward the northwest at an angle of about 20° with the plane of the horizon, moving rather slowly and shining brilliantly with a greenish light. It very soon after burst into numerous fragments, the position at rupture bearing about 30° west of south from the end of the Norfolk and Washington steamboat pier at Alexandria, Va., and being at an elevation of about 10° above the horizon.

THOS. L. CASEY.

X-RAY PHOTOGRAPHY BY MEANS OF THE CAMERA.

I HAVE recently succeeded in producing X-ray pictures, reducing them in their linear dimensions to one-fifth the size of the object. The method used was to produce on a tungstate of calcium screen the shadows of the object, the screen with its contents being then photographed by means of the camera in the ordinary way.

The photographs thus obtained reveal the details more clearly than the eye can see them on the screen, and, in fact, reveal details not visible to the eye.

There is some advantage in this method over that usually employed. The photographic plates may be made of reasonable size for large objects. The pictures gain somewhat in definition, as penumbral effects are reduced. The disadvantages are the difficulty of accurately focussing the faint images on the ground glass of the camera, and the longer time of exposure needed to bring out the picture. I think it probable that these difficulties may not be very serious to those possessing the best facilities for making further study in this direction.

FRANCIS E. NIPHER.
WASHINGTON UNIVERSITY,
ST. LOUIS, May 11, 1896.

THE ROTATING CATHODE.

SINCE writing an account of my observation on the rotation of the cathode disc (p. 750) it has occurred to me that a circular or elliptical vibration of the cathode wire might possibly account for the observed effect. The tube on which the observation was made has been cracked, and now ceases to give the result, nor am I able to impart rotation in one direction only to the disc by familiar mechanical means that could have existed in the tube. The observation is one of such great interest that I think I should suggest the above possible explanation, which had not sooner occurred to me, in order to prevent experimenters from going on what may be a wild-goose chase.

FRANCIS E. NIPHER.
MAY 13.

SCIENTIFIC LITERATURE.

The Principles of Museum Administration. By G. BROWN GOODE, LL. D. (Reprinted from the Annual Report of the Museum Association, 1895.) York, 1895. Pp. 73.

"The degree of civilization to which any nation, city, or province has attained, is best shown by the character of its public museums and the liberality with which they are maintained." The above sentence—the concluding sentence of the paper before us—sets forth in striking phrase the importance of the subject with which the paper deals. Superlatives are in general things which a cautious man views with suspicion, and it may well be doubted whether any one index of the state of civilization can be said to be the best. But that museums afford one of the most trustworthy indices of the progress of civilization cannot be doubted. The indication which they afford is decidedly flattering to our generation; for this is certainly preëminently the age of museums. In the number of museums, large and small, general and special, in the munificence with which they are sustained and endowed, in the knowledge,